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ABSTRACT

This study examined whether or not student, parent, and peer engagement factors that contribute to at-risk students' success in graduating from high school continue to be important in making the transition from high school to postsecondary education. The data set used was the National Education Longitudinal Study of 1988, which included 1994 data obtained two years after students' scheduled high school graduation. At-risk students exhibited two or more of six risk factors, including "family in the lowest socioeconomic quartile" or "held back a grade". Analysis used alternative statistical methodology, specifically regression analysis and the "odds ratios" produced by this procedure. Key findings indicated that: (1) students whose parents frequently discussed school-related matters and/or had high educational expectations were much more likely than other students to enroll in postsecondary education; (2) students who reported that most or all of their high school friends planned to attend college were far more likely to attend themselves; (3) participating in college preparation activities such as gathering information about financial aid increased the odds of enrolling in postsecondary education; and (4) moderate- to high-risk students participating in college outreach programs were more likely to attend college. Appended are a glossary and technical and methodology notes. (Contains 11 references.) (DB)

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Toward Resiliency

At-Risk Students Who Make It to College

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HIGHLIGHTS

The aim of this study was to determine whether student, parent, and peer engagement factors that contributed to at-risk students' success in graduating from high school continued to be important in making the transition from high school to postsecondary education. Only students who were considered at moderate to high risk of dropping out of high school were included in the analysis (about one-quarter of 1992 high school graduates). They were identified as those exhibiting two or more of the following six risk factors: family in the lowest socioeconomic quartile, from a single-parent home, earned grades of C's or lower from 6th to 8th grade, held back a grade, changed schools two or more times outside of the normal progression, or have an older sibling who dropped out of high school. Key findings are as follows.

- Parent and peer engagement indicators were especially strong influences on postsecondary enrollment. Moderate- to high-risk youth whose parents frequently discussed school-related matters with them in high school had much higher odds of both 4-year college enrollment and enrollment in any postsecondary education, compared with their peers whose parents had no discussions with them. Parents' educational expectations also exerted a strong influence on whether or not moderate- to high-risk teens enrolled in any postsecondary education.
- Compared to students whose friends did not have college plans, students who reported that most or all of their high school friends had plans for enrolling in a 4-year college were far more likely to enroll in a 4-year college themselves. The importance that friends attributed to learning activities such as studying and getting good grades had a strong positive effect on whether or not students enrolled in any postsecondary education, but not on whether they enrolled in a 4-year college.
- Participating in college preparation activities increased the odds of enrolling in postsecondary education. Gathering information about financial aid and talking to individuals about aid increased the odds of enrolling in any postsecondary education, while getting help with preparing for entrance exams and the college application process increased the odds of enrolling in a 4-year college.
- Moderate- to high-risk students who reported participating in college outreach programs increased their odds of enrolling in a 4-year college nearly twofold.

FOREWORD

In December 1997, the National Center for Education Statistics (NCES) published *Confronting the Odds: Students at Risk and the Pipeline to Higher Education* (NCES 98-094), prepared by Laura Horn of MPR Associates. This study was one in a series known as the Postsecondary Education Descriptive Analysis Reports (PEDAR). The PEDAR reports are based principally on data collected in NCES' longitudinal studies, and have covered such topics as transfer behavior, part-time undergraduates, minority student participation, packaging of financial aid, and others (these and other NCES publications are available for downloading at this website: http://nces.ed.gov).

The National Institute on Postsecondary Education, Libraries, and Lifelong Learning (PLLI) is housed in the same organizational unit of the U.S. Department of Education as NCES, and its staff interacts frequently with NCES, serving on technical review panels, performing data editing services, and assisting in the development of surveys.

In the course of reviewing drafts of *Confronting the Odds*, PLLI was intrigued by the possibility of taking a more focused look at the "at-risk" population in relation to postsecondary enrollment and persistence. Specifically, we wanted to concentrate on moderate- to high-risk high school students who overcame the odds and enrolled in higher education, and to provide some idea of how this population was distributed by race–ethnicity. We thus asked MPR Associates to conduct a second analysis of the issue.

We were also interested in an alternative statistical methodology, namely, logistic regression and the explanatory power of the "odds ratios" produced by this procedure. One might note, for example, that 80 percent of the students who enrolled in a 4-year college reported that all or most of their friends had planned to attend college (see *Confronting the Odds*, p. 35). That statement, however, is not as persuasive as the observation in this document, that the odds of attending a 4-year college are 6 times as high if all or most of your friends plan to attend college than if none of your friends plans to attend. Odds ratios can be powerful tools for high school counselors, teachers, and college outreach workers.

The data set used in both *Confronting the Odds* and *Toward Resiliency* is the National Education Longitudinal Study of 1988 (NELS:88). The most recent survey of this group (1994) took place two years after their scheduled high school graduation. At that time, 75 percent of the high school graduates had entered postsecondary education, and 60 percent were still enrolled (Berkner and Chavez 1997). Whether these students will complete degrees or whether others will return to higher education will not be known until after the next scheduled NELS:88 survey in the year 2000. *Toward Resiliency* helps establish some key lines of analysis on persistence and completion that will be used at that time.

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Thanks to Cliff Adelman at OERI for his careful review and guidance in the development of this report. At MPR Associates, Phil Kaufman reviewed the report and provided helpful criticism. Thanks also to MPR staff members Helen Jang, Francesca Tussing, Karyn Madden, and Barbara Kridl for editing and producing the final report.

TABLE OF CONTENTS

	Page
Highlights	iii
Foreword	iv
Acknowledgments	vi
List of Tables	viii
List of Figures	ix
Introduction	1
Background	1
Data, Definitions, and Methods	3
Risk, Outcomes, and Engagement	3
Risk Factors	3
Postsecondary Outcome Measures	8
Engagement Indicators	10
College Preparation Activities	11
Sample of At-Risk Students	12
Statistical Methods	12
Results	13
The Independent Effect of Engagement Variables: Hierarchical Regression Models	17
Odds for Attending a 4-Year College Versus Others	17
Odds for Attending Some Postsecondary Education Versus None	20
Odds for Strong Postsecondary Education Persistence Indicators	20
Summary and Conclusions	25
References	29
Appendix A—Glossary	31
Appendix B—Technical Notes and Methodology	39

LIST OF TABLES

Table		Page
1	Percentage of 1992 high school graduates, by level of risk and the average number of risk factors among all high school graduates	4
2	Percentage of 1992 high school graduates with each risk factor, by risk status and all other risk factors	6
3	Percentage distribution of 1992 high school graduates according to race–ethnicity, by risk status and individual risk factors	7
4	Percentage distribution of 1992 high school graduates according to parents' highest educational attainment, by risk status and individual risk factors	8
5	Percentage distribution of 1992 high school graduates according to the first post-secondary institution attended, by risk status and individual risk factors	9
6	Logistic regression for the probability of moderate- to high-risk students: (1) attending a 4-year college versus all others, (2) enrolling in any postsecondary education versus none, and (3) exhibiting strong postsecondary persistence indicators versus all others	14
7	Four-step logistic regression for probability of moderate- to high-risk students attending a 4-year college versus all others predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=2,878)	18
8	Four-step logistic regression for probability of at-risk students attending some postsecondary education versus none, predicted by student engagement, parent engagement, friends' engagement with learning, and college preparation activities (N=2,796)	21
9	Four-step logistic regression for moderate- to high-risk students exhibiting strong persistence indicators in postsecondary education, predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=1,667)	23

LIST OF FIGURES

Figure		Page
1	Percentage distribution of 1992 high school graduates, by risk status	5

INTRODUCTION

As the American economy demands a more educated and highly trained work force, it has become increasingly important for American youth to continue their education beyond high school. Given these demands, it is encouraging to note that nearly two-thirds of 1988 8th-graders had enrolled in some form of postsecondary education by 1994, two years after most completed high school (Sanderson et al. 1996), and that three-quarters of high school graduates had enrolled (Berkner and Chavez 1997). Nonetheless, there were still great disparities in postsecondary enrollment when socioeconomic status was considered: 36 percent of students from families in the lowest socioeconomic quartile had enrolled in some postsecondary education, while the vast majority (88 percent) of students in the highest quartile had done so. The purpose of this research, however, is not to present evidence concerning well-known and documented disparities, but to explore why certain students identified as at risk of school failure managed to succeed in school and enroll in postsecondary education despite social and educational disadvantages. How are these students different from their less successful at-risk counterparts?

The study took advantage of a considerable amount of research that has been conducted by MPR Associates, Inc. for the National Center for Education Statistics in two areas: (1) at-risk secondary school populations, and (2) issues related to postsecondary access and choice. The current study combines these two areas by identifying students at risk according to factors that increase their likelihood of dropping out of high school, and then examines the experiences of at-risk youth who not only managed to graduate from high school, but who also entered postsecondary education.

BACKGROUND

Chen and Kaufman recently expanded on research first conducted by Kaufman and Bradby (1992), who used the 1988 National Education Longitudinal Study (NELS:88) to profile 8th-graders at risk of dropping out of school between 8th and 10th grade. Chen and Kaufman's study (1997) extended the time frame through the second follow-up (1992) when most of the cohort graduated from high school, to compare at-risk students who dropped out of high school with their resilient counterparts (at-risk students who graduated). To understand why resilient students

remained in school despite the odds against their doing so, factors such as family stability, parental involvement in school activities, students' attitudes about learning, and peer associations were examined and compared to the experiences of students who dropped out. The results revealed that resilient students had more positive attitudes about school, had more cohesive families, had parents who were more supportive of their schooling, and had peers more engaged in school than did dropouts. The study concluded that these positive experiences play a protective role in reducing the impact of risk on resilient students.

The analysis reported here identifies students at risk according to similar risk factors that were defined in Chen and Kaufman's study and tracks the progress of the resilient at-risk students to see if they continued their education beyond high school. The analysis also builds on the findings from a descriptive study recently published by the National Center for Education Statistics (Horn 1997), which described high school graduates' experiences in the "pipeline" to higher education. The pipeline refers to five junctures or steps necessary to make the successful transition from high school to college. These include having a bachelor's degree goal, being at least minimally prepared academically to attend college, taking entrance exams, applying to college, and enrolling in college. The pipeline study determined how at-risk students differed from their counterparts who were not at-risk in terms of their college pipeline experiences and further compared at-risk students who successfully enrolled in a 4-year college with their at-risk counterparts who did not. The results indicated that even among students who were at least minimally prepared academically to enroll in college, at-risk students were less likely to take entrance exams and apply to college than were their counterparts who were not at risk. The results further suggested that there were certain student, parent, and peer engagement indicators that distinguished "successful" at-risk students—those who went on to college—from their at-risk peers who did not enroll.

This analysis expands on the pipeline study by using logistic regression models to determine if the engagement indicators analyzed in previous studies increased the likelihood of moderate- to high-risk students enrolling in postsecondary education, after controlling for risk factors, math coursetaking, and achievement measures, as well as activities presumed to be important for preparing for college.

DATA, DEFINITIONS, AND METHODS

RISK, OUTCOMES, AND ENGAGEMENT

Risk Factors

In earlier studies conducted on the base-year and first follow-up NELS surveys (8th- and 10th-graders), many factors were identified as being associated with an increased probability of school failure and dropping out (Kaufman and Bradby 1992). These factors were often highly correlated with students' demographic characteristics, especially gender, race–ethnicity, and socioeconomic status (SES). However, after controlling for these demographic factors, there were five factors related to family background or early school experiences that still substantially increased the odds of dropping out of high school.[1] These factors included being from a single parent household, having an older sibling who dropped out of high school, changing schools two or more times other than the normal progression (e.g., from elementary to middle school), having poorer than average grades, and repeating an earlier grade. Therefore, in this analysis, SES and the additional five risk factors (listed below) are used to identify 8th-graders at risk.[2]

- Lowest socioeconomic quartile
- Single-parent family
- Older sibling dropped out of high school (asked in the 10th grade)
- Changed schools two or more times from 1st to 8th grade
- Average grades of C's or lower from 6th to 8th grade
- Repeated an earlier grade from 1st to 8th grade

[1]In Chen and Kaufman's study, a sixth factor, having limited English proficiency, was also identified. However, after controlling for all other risk factors, limited English proficiency was a weak predictor of dropping out. In addition, the students identified in the NELS:88 survey who were of limited English proficiency were those who were proficient enough to complete the questionnaire and were thus not necessarily representative of all limited English proficiency 8th-graders in 1988. Thus, language proficiency was not considered a risk factor for this analysis.

[2]The at-risk population identified in this study differs slightly from Chen and Kaufman's study for two of the risk factors, lower than average grades and changing schools. The current study characterized students according to their risk status in the 8th grade (with the exception of having dropout siblings which was asked in the first follow-up survey). Therefore, having grades of C's or lower was determined from 6th to 8th grades and changing schools was determined from 1st through 8th grades. Chen and Kaufman's study, on the other hand, included high school grades and changing secondary schools.

Students were further identified according to their level of risk based on the number of risk factors they had accumulated. One risk factor was considered low risk; two risk factors constituted moderate risk; and students with three or more risk factors were considered to be at high risk of dropping out. In their preliminary analysis, Chen and Kaufman (1997) found that students who showed at least two risk factors had much higher odds of dropping out of school than students who had no risk factors. In terms of odds, compared with students with no risk factors, students who had one risk factor were 4 times more likely to drop out of school, students who had two risk factors were 13 times more likely to drop out, and students who had three or more risk factors were 30 times more likely to drop out. For this study, therefore, we focused on students at moderate or high risk.

Table 1 identifies 1992 high school graduates according to their risk status. Approximately one-third were at low risk (one risk factor), 16 percent were at moderate risk (two risk factors), and 9 percent were at high risk (three or more risk factors). The average number of risk factors among all 1992 high school graduates was about 1.7. This analysis includes only students considered at moderate or high risk. They constitute about one-quarter of the cohort of 1992 high school graduates (figure 1).

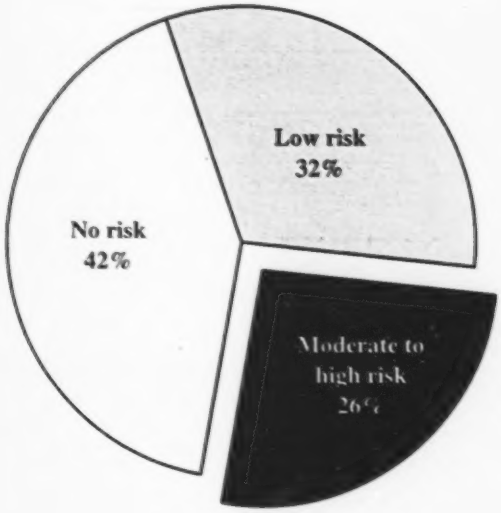
Table 1.—Percentage of 1992 high school graduates, by level of risk and the average number of risk factors among all high school graduates

	Low risk	Moderate risk	High risk	Average number of risk factors
Total*	32.2	16.3	9.3	1.7
Individual risk factors				
Changed schools two or more times from 1st to 8th grade (other than natural progression)	46.8	29.9	23.3	1.9
Lowest SES quartile	31.1	34.1	34.7	2.2
Average grades C's or lower from 6th to 8th grade	31.2	36.3	32.5	2.2
Single parent family	32.7	34.1	33.3	2.2
Older sibling(s) dropped out of high school	22.6	35.5	41.9	2.4
Held back one or more grades from 1st to 8th grade	19.9	38.7	41.4	2.4

*The three risk categories account for 57.8 percent of the sample of high school graduates. The remaining 42.2 percent constitute the "no risk" group.

SOURCE: U.S. Department of Education, National Center for Education Statistics, *Confronting the Odds: Students at Risk and the Pipeline to Higher Education* (NCES 98-094). Data from the National Education Longitudinal Study (NELS:88/94), Data Analysis System.

Figure 1.—Percentage distribution of 1992 high school graduates, by risk status



SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94), Data Analysis System.

As shown in table 2, the most common risk factor was changing schools two or more times (27 percent) followed by being in the lowest socioeconomic quartile (18 percent) and having grades of C's or lower from 6th to 8th grade (17 percent). Approximately 15 percent of NELS high school graduates lived in a single parent home as 8th-graders and 11 percent either had been held back a grade or had siblings who dropped out of high school. Those who were held back or who had a sibling who dropped out of school had more risk factors on average than students with other risk factors (see table 1). Table 2 also illustrates how the risk factors are interrelated. For example, among high-risk students, two thirds had changed schools two or more times. The same proportion (66 percent) were in the lowest socioeconomic quartile, and more than half of high-risk students had grades of C's or lower or had single parents.

As might be expected, given the inclusion of low SES as a risk factor, students at moderate or high risk were more likely to be African American or Hispanic than were students at lower

risk (table 3). In fact, African Americans were about twice as likely to be at high risk (22 percent) than they were to be at low risk (10 percent).

Table 2.—Percentage of 1992 high school graduates with each risk factor, by risk status and all other risk factors

	Changed schools two or more times from 1st to 8th grade	Lowest SES quartile	Average grades C's or lower from 6th to 8th grade	Single parent family	Older sibling(s) dropped out of high school	Held back one or more grades from 1st to 8th grade
Total	26.8	18.2	16.7	15.3	11.2	11.2
Risk status						
Low risk	38.7	17.1	16.1	15.3	7.8	6.9
Moderate risk	49.6	37.1	37.0	31.7	24.4	26.9
High risk	66.4	66.0	57.9	54.0	48.7	51.2
Number of school changes from 1st to 8th grade						
Two or more times	100.0	18.8	20.3	19.2	14.6	16.6
Less than two	0.0	16.9	15.0	13.6	9.4	8.7
SES in 1988						
Lowest quartile	29.0	100.0	26.1	25.0	24.4	20.3
Middle to high quartiles	26.3	0.0	14.7	13.1	8.1	9.3
Average grades from 6th to 8th grade						
C's or lower	33.0	28.1	100.0	21.1	16.6	23.2
A's or B's	25.5	16.0	0.0	14.1	9.8	8.8
Family composition in 1988						
Single parent family	34.0	29.7	23.2	100.0	17.4	17.4
Other than single parent	25.5	16.1	15.6	0.0	9.8	10.1
Older siblings who left high school						
One or more	35.0	38.8	24.7	23.8	100.0	20.8
None left or no siblings	24.6	14.8	15.2	13.9	0.0	9.6
Ever held back 1st to 8th grade						
Held back at least once	40.8	31.3	33.1	23.1	20.4	100.0
Not held back	24.9	15.5	13.7	13.8	9.5	0.0

NOTE: This table represents percentages of the row categories. For example, the first row under "Risk status" reads: Among low-risk high school graduates, 38.7 percent changed schools two or more times, 17.1 percent were in the lowest socioeconomic quartile, 16.1 percent had C's or lower, and so on.

SOURCE: U.S. Department of Education, National Center for Education Statistics, *Confronting the Odds: Students at Risk and the Pipeline to Higher Education* (NCES 98-094). Data from the National Education Longitudinal Study (NELS:88/94), Data Analysis System.

Table 3.—Percentage distribution of 1992 high school graduates according to race–ethnicity, by risk status and individual risk factors

	Race–ethnicity				
	Asian/ Pacific Islander	Hispanic	Black, non-Hispanic	White, non-Hispanic	American Indian/ Alaskan Native
Total	4.6	9.5	10.9	74.1	1.0
Risk status					
No risk	3.7	4.8	5.4	85.4	0.7
Low risk	4.4	10.8	9.8	74.3	0.7
Moderate risk	3.3	11.9	16.0	67.6	1.3
High risk	3.1	13.7	21.9	60.2	1.2
Individual risk factors					
SES in 1988					
Lowest quartile	3.2	21.7	20.1	53.7	1.3
Middle to high quartiles	4.1	6.2	8.1	80.8	0.8
Family composition in 1988					
Single parent family	1.7	8.6	24.1	64.5	1.1
Other than single parent	4.3	9.0	7.9	78.1	0.9
Number of older siblings who left high school					
One or more	4.0	13.0	14.3	67.5	1.3
None left or no siblings	4.0	7.8	9.3	78.1	0.8
Number of school changes from 1st to 8th grade					
Two or more times	5.6	10.2	12.2	71.1	0.9
Less than two	3.2	7.6	9.2	79.3	0.7
Average grades from 6th to 8th grade					
C's or lower	3.1	10.8	11.9	72.9	1.3
A's or B's	4.0	8.5	10.0	76.7	0.8
Ever held back 1st to 8th grade					
Held back at least once	3.2	11.0	15.7	68.7	1.4
Not held back	4.0	8.5	8.6	78.2	0.8

NOTE: Details may not sum to 100 percent because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, *Confronting the Odds: Students at Risk and the Pipeline to Higher Education* (NCES 98-094). Data from the National Education Longitudinal Study (NELS:88/94), Data Analysis System.

Since parents' education is a component of SES, it is also not surprising that moderate- to high-risk students also had less educated parents than their lower risk counterparts (table 4). More than half (58 percent) of high-risk students had parents who had completed no more than a high school education, compared with about one-quarter of low-risk students.

Table 4.—Percentage distribution of 1992 high school graduates according to parents' highest educational attainment, by risk status and individual risk factors

	Parents' highest education		
	High school or less	Some postsecondary education	Bachelor's degree or higher
Total	26.5	41.0	32.5
Risk status			
No risk	11.8	41.9	46.4
Low risk	24.9	43.0	32.1
Moderate risk	42.6	41.0	16.4
High risk	57.5	36.3	6.2
Individual risk factors			
SES in 1988			
Lowest quartile	76.1	23.6	0.3
Middle to high quartiles	13.7	45.7	40.7
Family composition in 1988			
Single parent family	37.3	43.3	19.4
Other than single parent	23.1	41.2	35.7
Number of older siblings who left high school			
One or more	42.9	43.6	13.5
None left or no siblings	23.7	40.3	36.0
Number of school changes from 1st to 8th grade			
Two or more times	23.1	42.8	34.1
Less than two	24.9	41.5	33.6
Average grades from 6th to 8th grade			
C's or lower	37.8	46.0	16.2
A's or B's	22.7	40.7	36.6
Ever held back 1st to 8th grade			
Held back at least once	36.8	44.5	18.8
Not held back	23.0	41.4	35.6

NOTE: Details for percentage distribution may not sum to 100 percent because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, *Confronting the Odds: Students at Risk and the Pipeline to Higher Education* (NCES 98-094). Data from the National Education Longitudinal Study (NELS:88/94), Data Analysis System.

Postsecondary Outcome Measures

We analyzed three outcomes in this study: two enrollment outcomes and one indicator of postsecondary education persistence. All of the outcome measures are dichotomous, meaning that students either achieved the outcome or they did not. The two enrollment outcomes are 4-

year college enrollment by 1994 versus all other behaviors (including enrollment in less-than- 4-year institutions); and enrollment in any postsecondary education (from short-term vocational programs to bachelor's degree programs) within the same time period versus no enrollment. Table 5 shows where students enrolled relative to their risk status. It is clear from this table

Table 5.—Percentage distribution of 1992 high school graduates according to the first postsecondary institution attended, by risk status and individual risk factors

	Type of institution first enrolled by 1994			
	4-year institution	Public 2-year institution	Other less-than-4-year institution	Never enrolled
Total	45.1	25.7	4.4	24.8
Risk status				
No risk	63.5	21.9	2.4	12.2
Low risk	45.1	26.0	5.2	23.8
Moderate risk	27.0	28.4	5.9	38.7
High risk	14.0	29.7	7.1	49.2
Individual risk factors				
SES in 1988				
Lowest quartile	21.7	25.2	6.3	46.8
Middle to high quartiles	52.1	25.2	3.9	18.8
Family composition in 1988				
Single parent family	38.6	28.1	4.7	28.7
Other than single parent	48.3	24.5	4.3	22.9
Number of older siblings who left high school				
One or more	25.7	28.7	5.5	40.1
None left or no siblings	49.8	24.8	4.2	21.2
Number of school changes from 1st to 8th grade				
Two or more times	39.8	28.0	6.1	26.1
Less than two	50.0	24.1	3.6	22.3
Average grades from 6th to 8th grade				
C's or lower	16.3	29.8	7.7	46.2
A's or B's	52.8	24.2	3.7	19.3
Ever held back 1st to 8th grade				
Held back at least once	20.6	30.0	5.3	44.2
Not held back	51.2	24.4	4.1	20.3

NOTE: Details for percentage distribution may not sum to 100 percent because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94), Data Analysis System.

that students at moderate or high risk were far less likely than those at low risk or no risk to enroll in a 4-year college and far less likely to enroll in any postsecondary education. For example, just 14 percent of high-risk students enrolled in a 4-year college, and nearly half did not enroll in any postsecondary education, compared with 45 percent and 24 percent, respectively, of their low-risk counterparts. Furthermore, as the level of risk increased, the likelihood of enrolling decreased. The table also shows that students with each individual risk factor were less likely to enroll in a 4-year college and, with one exception,[3] were less likely to enroll in any postsecondary education than students without the risk factor.

The third outcome was an indicator of persistence in postsecondary education, a measure that characterizes students according to postsecondary education enrollment patterns known to reduce their chances of attaining a degree (Carroll 1989, Tuma and Geis 1996, Berkner et al. 1996, and Horn 1996). These patterns include delaying postsecondary education by a year or more after high school graduation, beginning postsecondary education on a part-time basis, or not attending continuously from the time of initial enrollment (i.e., stopping for four or more months). If students exhibited none of these enrollment behaviors (they enrolled full time within a year after high school graduation and attended continuously), they were considered to have a better chance at persisting to degree completion. These students were identified as exhibiting strong postsecondary education persistence.

Engagement Indicators

The purpose of this study is to better understand the experiences of moderate- to high-risk youth who not only managed to graduate from high school, but who enrolled in higher education. Thus, we investigated the effect of engagement behaviors of students, their parents, and their peers on the likelihood of enrolling in postsecondary education. We also determined to what effect, if any, certain college preparation activities had on enrollment outcomes. The engagement indicators included in the models are strongly associated with the likelihood of at-risk students completing high school (Chen and Kaufman 1997).

Student Engagement

Level of high school attendance and the number of extracurricular activities students reported participating in were used as indicators of student engagement. The attendance variable is

[3]Students who changed schools two or more times did not differ markedly from those who did not change schools no more than one time with regard to the proportion who did not enroll in any postsecondary education (26 percent and 22 percent).

a composite based on a factor analysis of several items asked of students regarding how many times they had been late for school, skipped school, or been absent. The number of extracurricular activities was a direct item asking students to report the number of activities in which they had participated. Such activities included involvement in student government, band, service clubs, and so on.

Parent Engagement

Parent engagement indicators were based on two parent involvement measures: their educational expectations for their child (reported in 1990 when most students were in the 10th grade) and how involved they were with their child's schooling (reported in 1992). The involvement indicator is a composite based on a factor analysis of several items asking the parent(s) to report on the frequency with which they discussed the following matters with their child: the selection of high school courses, school activities of particular interest to their child, topics their child has studied in class, plans for taking entrance exams, and applying to colleges.

Peer Engagement

Two indicators of peer engagement were included in the models (both of which were reported by the student). The first is a measure of importance that students believed their friends attributed to learning activities. The learning activities indicator was based on a factor analysis of items asked of students in 1990 regarding how important they thought their friends considered the following activities: attending classes, studying, getting good grades, finishing high school, and continuing education past high school. The second peer involvement indicator was based on how many students' friends had plans to attend a 4-year college.

College Preparation Activities

A number of variables in the NELS survey indicated the frequency with which students reported participating in college preparation programs or activities. These activities included gathering information about financial aid, participating in outreach programs such as Upward Bound, taking special courses for entrance exam preparation, and receiving help from their high school teachers or staff in preparing college and financial aid applications. A number of these variables are composites made up of several related items. For example, whether or not students got help in preparing for entrance exams is constructed from student responses to questions about taking a special course in high school or from a commercial test service, getting private tutoring, studying

test booklets, or using special videotapes or test-related computer programs to prepare for exams. Whether or not students received help in the college application process was based on students' answers to questions about assistance from their high school in filling out college or financial aid applications, writing their application essay, or getting days off to visit colleges.

SAMPLE OF AT-RISK STUDENTS

The sample for this study was drawn from the National Education Longitudinal Study (NELS:88/94). Students were included in the analyses if they: (1) had two or more risk factors; (2) had graduated from high school in 1992; and (3) had data on the outcome variables examined in the analysis. Application of these selection criteria resulted in samples ranging from about 1,700 to 2,900 students (depending upon which outcome was used).

STATISTICAL METHODS

Because all the outcome measures in the study are dichotomous (0=No, 1=Yes), we used logistic regressions to determine the independent effect of the engagement variables on the outcomes. The results are presented in terms of odds ratios, a measure of the relative odds of achieving a particular outcome (such as enrolling in college) for students with a particular characteristic (such as those whose parents frequently discussed school-related matters with them) compared with a reference group (such as those whose parents had infrequent discussions). It should be noted that odds ratios are not the same as the ratio of percentages. For example, if the odds ratio of a student who participates in extracurricular activities is 2.0 for enrolling in college relative to students who participated in no extracurricular activities, the odds of the former group attending college are twice as high as the latter group. But they are not necessarily twice as likely to attend. While odds ratios and ratios of percentages are often similar, they may not be the same. In this report, reference to greater or lesser likelihood refers only to a change in odds.

Two achievement measures were controlled for in all the models: (1) the cumulative score from a NELS 8th-grade battery of tests in mathematics, reading, science, and social science administered to the NELS cohort in grade 8; and (2) the highest level of high school mathematics courses taken by at-risk students as reported on their high school transcripts. The test score is a continuous variable, while the mathematics variable is categorical with eight possible levels ranging from no math to calculus. For more detailed information about variables included in the models, see the glossary in appendix A.

RESULTS

Many of the engagement variables measuring student involvement, parent involvement, parent expectations, and peer association had a significant effect on the enrollment outcome measures. These engagement variables, originally found to be important for reducing at-risk students' odds of dropping out of high school, were also important for increasing the odds of at-risk high school graduates advancing from high school graduation to postsecondary enrollment.

To begin the analysis, the effect of each engagement variable on the three outcome measures was determined separately after controlling for the six risk factors and two measures of students' achievement. The results for the individual variables are shown in table 6. Asterisks indicate statistical significance, meaning those behaviors or characteristics with one or two asterisks had a significant effect on the outcome measure.

To interpret the results, consider the first odds ratio with asterisks that appears in table 6, column 1. It is the odds ratio for participating in two or more extracurricular activities (2.09). This number means that among moderate- to high-risk students, the odds of enrolling in a 4-year college for students who participated in two or more extracurricular activities were 2.09 times higher than those who participated in no extracurricular activities. This was true even when controlling for the six risk factors and two student achievement measures. Students who participated in only one extracurricular activity, however, did not have significantly higher odds in enrolling in a 4-year college than their counterparts who participated in no activities (i.e., the result was not statistically significant). Similar results were found for the odds of enrolling in any postsecondary education versus not enrolling: two or more extracurricular activities increased the odds of enrolling in any postsecondary education by about 59 percent over not participating in any activities (odds ratio=1.59).

The other student engagement indicator (attendance patterns) did not have a significant effect on enrollment outcomes, but did have an effect on whether students exhibited strong persistence patterns once enrolled in postsecondary education. Those who reported either moderate or high secondary school attendance levels were more likely to show indications of strong persistence in postsecondary education than those who reported low levels of high school attendance. The odds ratios were 1.62 and 1.74, respectively.

Table 6.—Logistic regression for the probability of moderate- to high-risk students: (1) attending a 4-year college versus all others, (2) enrolling in any postsecondary education versus none, and (3) exhibiting strong postsecondary persistence indicators versus all others[1]

	Odds ratio[3]		
Predicted variable[2]	4-year college vs. other (N=2,878)	Some PSE vs. none (N=2,796)	Strong PSE persistence vs. others in PSE (N=1,667)
Student engagement with school			
Areas of extracurricular activities student participated in			
One	1.34	1.16	0.96
Two or more	2.09**	1.59**	1.14
None (comparison group)			
Student's school attendance			
Moderate attendance	1.29	0.98	1.62*
High attendance	1.53	0.94	1.74**
Low attendance (comparison group)			
Parent engagement with student's learning			
Parents' educational expectations for student			
Vocational/trade	0.78	1.69	2.93
Some college	1.60	2.99**	1.59
Bachelor's degree	2.37	3.04**	2.28
Advanced degree	2.08	3.19**	2.15
High school diploma/less (comparison group)			
Parents discussed school-related matters with student			
Some discussion	1.52	1.57**	1.13
Much discussion	2.17**	2.45**	1.25
Little to no discussion (comparison group)			
Friends' engagement with learning			
Importance of learning to student's friends			
Moderately important	1.44	1.42*	1.43
Highly important	1.71*	2.40**	1.63
Not very important (comparison group)			
Number of friends who planned to attend a 4-year college			
Few to some	1.96	1.59*	0.87
Most to all	6.01**	2.80**	1.38
None (comparison group)			
College preparation activities			
Amount of aid information used by student			
One	1.38	1.63**	0.94
Two or more	1.93**	1.98**	1.63*
None (comparison group)			

Table 6.—Logistic regression for the probability of moderate- to high-risk students: (1) attending a 4-year college versus all others, (2) enrolling in any postsecondary education versus none, and (3) exhibiting strong postsecondary persistence indicators versus all others[1]—Continued

Predicted variable[2]	Odds ratio[3] 4-year college vs. other (N=2,878)	Some PSE vs. none (N=2,796)	Strong PSE persistence vs. others in PSE (N=1,667)
Number of people student talked to about aid			
One	1.78	1.91**	1.43
Two	2.00**	2.33**	1.57
Three	2.04**	2.75**	1.54
Four or more	2.28	1.31	1.54
None (comparison group)			
Participated in any HS outreach program			
Yes	2.88**	1.76	1.20
No (comparison group)			
Student got help preparing for entrance examination			
Yes	2.32**	1.73**	1.41*
No (comparison group)			
Student received help from school with college application process			
Yes	1.94**	1.66**	1.78**
No (comparison group)			

[1]Results in this table were estimated by the SUDAAN software, using the weight F3QWT92G.

[2]Each logistic regression controlled for six risk factors–socioeconomic status, number of times of changing school, GPA from grade 6 to 8, single parent family, ever held back, having one or more siblings who dropped out of school, and two achievement measures including the 8th-grade combined math, reading, science, and social studies test scores and level of mathematics courses taken over the four years of high school.

[3]*$p \leq .05$, **$p \leq .01$.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94).

Indicators of parent involvement had some of the strongest effects on increasing the odds of enrolling in postsecondary education. Certainly as a predictor for enrolling in any type of postsecondary education, parents' educational expectations for their children greatly increased the odds of attending. Students whose parents had expectations of even "some college" had nearly three times greater odds of attending some form of postsecondary education (odds ratio=2.99) than those whose parents had expectations for no more than high school graduation. Unlike enrollment in any postsecondary education, however, parents' educational expectations did not have a significant effect on the odds of attending a 4-year college once the six risk factors and

achievement levels were held constant.[4] One explanation for this result might be that most high-achieving students enroll in a 4-year college, and nearly all their parents expect them to attain at least a bachelor's degree. Therefore, there is little variation for levels of parental expectations relative to college enrollment. The results taken together may also mean that parents have a strong influence in getting their children into some form of postsecondary education, as evidenced by the significant effect for enrollment in any postsecondary education, but they have minimal influence on the level of postsecondary education in which their children enroll.

Students whose parents frequently discussed school-related matters with them had more than double the odds of enrolling in a 4-year college (odds ratio=2.17) than students whose parents had little to no discussion with them. Parent discussions—even some discussion—also had a strong effect on increasing the odds of a student attending any postsecondary education (odds ratios 1.57 and 2.45, respectively, for some and much discussion).

Students who reported that their peers were strongly involved in school also had higher odds of enrolling in a 4-year college, as well as attending any postsecondary education, compared to those whose peers were less involved. For example, students who reported that their friends considered learning activities highly important had about 70 percent higher odds of enrolling in a 4-year college (odds ratio=1.71) and almost two and a half times the odds of enrolling in any postsecondary education (odds ratio=2.4) than students whose friends considered such activities unimportant. Not surprisingly, students who reported that most or all of their friends intended to enroll in a 4-year college were highly likely do so themselves. In fact, friends' plans for college was the strongest predictor for 4-year college enrollment; students had six times higher odds of attending if most or all of their friends had similar plans (odds ratio=6.01). Likewise, compared with students with no friends planning to attend a 4-year college, if most or all of their friends had college plans, students had nearly three times higher odds of enrolling in any postsecondary education (odds ratio=2.8).

Finally, nearly all of the special college preparation activities increased the odds of moderate- to high-risk students attending a 4-year college, as well as attending any postsecondary education. Some were also important for increasing students' chances of exhibiting strong persistence indicators. For example, talking to at least two people about financial aid, getting help preparing for entrance exams, and getting help in the college application process were associated with strong persistence indicators. Participating in a high school outreach program, how-

[4]While the odds ratios for parents expecting a bachelor's degree (2.37) or an advanced degree (2.08) appear high, they are not statistically significant ($p<.05$).

ever, appeared to affect only 4-year college enrollment (odds ratio=2.88), but not enrollment in any postsecondary education, nor predicting strong persistence indicators.

In summary, once the six risk factors and two achievement measures were held constant, when the engagement variables were analyzed individually, most increased the odds of moderate- to high-risk students enrolling in a 4-year college and in any postsecondary education. The results were especially strong and consistent for parent involvement measures and peer plans for college. Whether or not students exhibited strong indicators of postsecondary education persistence, on the other hand, was affected only by levels of high school attendance and some of the special college preparation activities.

THE INDEPENDENT EFFECT OF ENGAGEMENT VARIABLES: HIERARCHICAL REGRESSION MODELS

While most of the engagement measures, when analyzed separately, had beneficial effects on college or postsecondary education enrollment, it is also true that many may be interrelated. For example, students whose parents have high educational expectations for them are probably more engaged in school, which in turn increases their chances of postsecondary enrollment. In order to take such associations into account, we expanded the logistic regression models to control for all the engagement variables in addition to controlling for the six risk factors and student achievement. Moreover, we entered the sets of engagement variables hierarchically, beginning with parent engagement (step 1), then student engagement (step 2), then peer association (step 3). Finally, the full model also included the set of college preparation activities (step 4). This procedure allows for the examination of how the effects of one particular engagement variable changes as other engagement variables are introduced into the model. The results for the three outcome measures are presented in tables 7–9.

Odds for Attending a 4-Year College Versus Others

Table 7 displays the odds ratios for moderate- to high-risk students attending a 4-year college versus those who attended less-than-4-year institutions or who did not enroll in any postsecondary education, as predicted by the engagement variables and college preparation activities. As shown in the "step 4" column, even when all other engagement variables are held constant, the positive effect of parents having frequent school-related conversations with their teen remained an important factor for increasing the odds of enrolling in a 4-year college.

Table 7.—Four-step logistic regression for probability of moderate- to high-risk students attending a 4-year college versus all others predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=2,878)[1]

Predicted variable[2]	Odds ratio for at-risk students attending 4-year college vs. other[3]			
	Step 1	Step 2	Step 3	Step 4
Parent engagement with student's learning				
Parents discussed school-related matters with student				
Missing	0.93	0.93	0.87	0.89
Some discussion	1.51	1.41	1.36	1.31
Much discussion	2.16**	2.11**	1.97**	1.84*
Parents' educational expectations for student				
Missing	1.54	1.44	1.23	1.35
Vocational/trade	0.78	0.71	0.78	0.80
Some college	1.50	1.41	1.27	1.22
Bachelor's degree	2.30	2.12	1.82	1.70
Advanced degree	1.93	1.77	1.46	1.30
Student engagement with school				
Student's class attendance				
Missing		1.03	0.85	0.82
Moderate attendance		1.28	1.16	1.05
High attendance		1.49	1.38	1.25
Extracurricular activities student participated in				
Missing		1.68	1.52	1.26
One		1.22	1.04	1.07
Two		1.86**	1.51	1.40
Friends' engagement with learning				
Importance of learning to student's friends				
Missing			1.92	1.64
Moderately important			1.19	1.15
Highly important			1.19	1.15
Number of friends who planned to attend a 4-year college				
Missing			2.78	3.31**
Few to some			1.79	1.50
Most to all			4.91**	4.00**
College preparation activities				
Amount of aid information used by student				
Missing				0.71
One				1.01
Two or more				1.27
Number of people student talked to about aid				
Missing				0.78
One				1.45
Two				1.41
Three				1.36
Four or more				1.18

Table 7.—Four-step logistic regression for probability of moderate- to high-risk students attending a 4-year college versus all others predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=2,878)[1]—Continued

Predicted variable[2]	Odds ratio for at-risk students attending 4-year college vs. other [3]			
	Step 1	Step 2	Step 3	Step 4
Participated in any HS outreach program				
Yes				1.97*
Student got help preparing for entrance exam				
Missing				0.68
Yes				1.82**
Student received help from school with college application process				
Missing				2.66
Yes				1.39*

[1]Results in this table were estimated by the SUDAAN software, using the weight F3QWT92G. The χ^2 values for each respective step are: 710.95, 735.55, 823.03, and 896.56. All are significant at $p \leq .01$.

[2]Each logistic regression controlled for six risk factors–socioeconomic status, number of times of changing school, GPA from grade 6 to 8, single parent family, ever held back, having one or more siblings who dropped out of school, and two achievement measures including the 8th-grade combined math, reading, science, and social studies test scores and level of mathematics courses taken over the four years of high school.

[3]*$p \leq .05$, **$p \leq .01$.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94).

Likewise, having friends with college plans remained a very strong predictor for 4-year college enrollment. In fact, holding all other engagement variables and college preparation variables constant, compared with students who reported that none of their friends had plans for a 4-year college, if most or all of their friends had college plans, the odds of moderate- to high-risk students attending were four times higher.[5]

College preparation activities also remained important in predicting 4-year college enrollment in the full model, especially if students participated in high school outreach programs. After all engagement variables were controlled for, students who reported participating in an outreach program had nearly twice the odds of enrolling in a 4-year college as those who did not. Similarly, getting help with college applications and preparing for entrance exams also remained important predictors of enrollment.

[5]The significant effect for students who had missing data for peer involvement probably indicates that these students likely had many peers with college plans but there is no way of determining this.

Odds for Attending Some Postsecondary Education Versus None

Table 8 displays the odds ratios for moderate- to high-risk students attending any form of postsecondary education versus those who never enrolled. The variables importance for predicting enrollment in any postsecondary education were slightly different from those for 4-year college enrollment. Controlling for all other engagement variables, *both* parent engagement variables—educational expectations and school-related discussions—were very strong predictors of enrollment. Likewise, both peer involvement variables had a significant effect on increasing the odds of enrolling in any postsecondary education. Among the college preparation activities, unlike 4-year college enrollment, obtaining financial aid information and talking to people about aid remained significant predictors of enrollment, but participating in high school outreach programs, preparing for entrance exams, and getting help with the application process did not.

Odds for Strong Postsecondary Education Persistence Indicators

Table 9 displays the results for whether or not students exhibited strong persistence indicators once they enrolled in postsecondary education. It is clear that once all the student, parent, and peer engagement variables were introduced in the model, none had a net independent effect on persistence indicators. Only the college preparation activity of obtaining help with the application process had an independent effect on increasing the odds of strong persistence. Thus, it appears that although the student, parent, and peer engagement variables examined in this analysis were important for predicting postsecondary and college enrollment, they had minimal effect on increasing the odds of strong persistence in postsecondary education among moderate- to high-risk students.

Table 8.—Four-step logistic regression for probability of at-risk students attending some postsecondary education versus none, predicted by student engagement, parent engagement, friends' engagement with learning, and college preparation activities (N=2,796) [1]

Predicted variable[2]	Odds ratio for at-risk students attending some PSE vs. none [3]			
	Step 1	Step 2	Step 3	Step 4
Parent engagement with student's learning				
Parents discussed school-related matters with student				
Missing	1.15	1.15	1.08	1.09
Some discussion	1.59**	1.57**	1.47*	1.50*
Much discussion	2.31**	2.26**	2.10**	1.96**
Parents' educational expectations for student				
Missing	2.24**	2.22**	2.15*	2.24*
Vocational/trade	1.73**	1.74**	1.79	1.63
Some college	2.91**	2.90**	2.63**	2.25**
Bachelor's degree	3.01**	2.96**	2.66**	2.38**
Advanced degree	3.05**	2.93**	2.50*	2.16*
Student engagement with school				
Student's class attendance				
Missing		1.12	1.02	1.04
Moderate attendance		0.94	0.85	0.82
High attendance		0.87	0.78	0.80
Extracurricular activities student participated in				
Missing		1.00	0.83	0.73
One		1.02	0.99	0.95
Two		1.43	1.27	1.18
Friends' engagement with learning				
Importance of learning to student's friends				
Missing			1.56*	1.47
Moderately important			1.29	1.26
Highly important			1.95**	1.82**
Number of friends who planned to attend a 4-year college				
Missing			1.82*	2.06*
Few to some			1.48	1.30
Most to all			2.27**	1.75*
College preparation activities				
Amount of aid information used by student				
Missing				0.81
One				1.05
Two or more				1.44*
Number of people student talked to about aid				
Missing				0.76
One				1.67*
Two				1.68*
Three				1.88*
Four or more				0.72

Table 8.—Four-step logistic regression for probability of at-risk students attending some postsecondary education versus none, predicted by student engagement, parent engagement, friends' engagement with learning, and college preparation activities (N=2,796) [1]—Continued

Predicted variable[2]	Odds ratio for at-risk students attending some PSE vs. none [3]			
	Step 1	Step 2	Step 3	Step 4
Participated in any HS outreach program				
Yes				1.40
Student got help preparing for entrance exam				
Missing				2.20
Yes				1.15
Student received help from school with college application process				
Missing				0.85
Yes				1.30

[1]Results in this table were estimated by the SUDAAN software, using the weight F3QWT92G. The χ^2 values for each respective step are: 550.63, 561.36, 621.06, and 750.18. All are significant at $p \leq .01$.

[2]Each logistic regression controlled for six risk factors–socioeconomic status, number of times of changing school, GPA from grade 6 to 8, single parent family, ever held back, having one or more siblings who dropped out of school, and two achievement measures including the 8th-grade combined math, reading, science, and social studies test scores and level of mathematics courses taken over the four years of high school.

[3]*$p \leq .05$, **$p \leq .01$.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94).

Table 9.—Four-step logistic regression for moderate- to high-risk students exhibiting strong persistence indicators in postsecondary education, predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=1,667)[1]

Predicted variable[2]	Odds ratio for full participation in PSE[3]			
	Step 1	Step 2	Step 3	Step 4
Parent engagement with student's learning				
Parents discussed school-related matters with student				
Missing	0.97	0.96	0.94	1.00
Some discussion	1.12	1.07	1.05	1.06
Much discussion	1.24	1.22	1.20	1.20
Parents' educational expectations for student				
Missing	1.21	1.23	1.34	1.45
Vocational/trade	2.96*	2.84*	3.07	3.02
Some college	1.59	1.60	1.71	1.64
Bachelor's degree	2.29	2.22	2.32	2.15
Advanced degree	2.12	2.06	2.04	1.90
Student engagement with school				
Student's class attendance				
Missing		1.60	1.50	1.55
Moderate attendance		1.59*	1.54	1.49
High attendance		1.69*	1.63	1.53
Extracurricular activities student participated in				
Missing		0.79	0.71	0.72
One		0.92	0.86	0.89
Two		1.06	0.97	0.95
Friends' engagement with learning				
Importance of learning to student's friends				
Missing			1.43	1.35
Moderately important			1.38	1.42
Highly important			1.49	1.52
Number of friends who planned to attend a 4-year college				
Missing			0.73	0.96
Few to some			0.79	0.73
Most to all			1.18	1.05
College preparation activities				
Amount of aid information used by student				
Missing				2.03
One				0.75
Two or more				1.28
Number of people student talked to about aid				
Missing				0.84
One				1.34
Two				1.35
Three				1.17
Four or more				0.98

Table 9.—Four-step logistic regression for moderate- to high-risk students exhibiting strong persistence indicators in postsecondary education, predicted by parent engagement, student engagement, friends' engagement with learning, and college preparation activities (N=1,667)[1]—Continued

Predicted variable[2]	Odds ratio for full participation in PSE [3]			
	Step 1	Step 2	Step 3	Step 4
Participated in any HS outreach program				
Yes				1.01
Student got help preparing for entrance exam				
Missing				0.84
Yes				1.24
Student received help from school with college application process				
Missing				0.45
Yes				1.51*

[1]Results in this table were estimated by the SUDAAN software, using the weight F3QWT92G. The χ^2 values for each respective step are: 238.04, 252.69, 272.69, and 316.09. All are significant at $p \leq .01$.

[2]Each logistic regression controlled for six risk factors–socioeconomic status, number of times of changing school, GPA from grade 6 to 8, single parent family, ever held back, having one or more siblings who dropped out of school, and two achievement measures including the 8th-grade combined math, reading, science, and social studies test scores and level of mathematics courses taken over the four years of high school.

[3]*$p \leq .05$, **$p \leq .01$.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study (NELS:88/94).

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine whether student, parent, and peer engagement factors that contributed to at-risk students' success in graduating from high school continued to be important in making the transition from high school to postsecondary education. The answer in large part, is yes for the parent and peer engagement variables, but less conclusive for the student engagement variables. The effect of the engagement variables also differed depending on the outcome.

Confirming the importance of parent involvement, both parent engagement measures in this analysis—the frequency of school-related discussions and parents' expectations for their teen's educational attainment—substantially increased the odds of moderate- to high-risk students enrolling in some form of postsecondary education. This effect persisted even after controlling for student achievement and taking into account peer and student engagement, as well as college preparation activities. Students' odds of enrolling were increased about two-fold even among those whose parents reported having only "some school-related discussions" (versus none) and among those whose parents reported relatively modest educational expectations for their child (e.g., "some college" short of a bachelor's degree).

The two measures of parent involvement had less of an impact on increasing the odds of enrolling in a 4-year college. Only students whose parents reported frequently discussing school-related matters with their teen exhibited significantly higher odds of enrolling, compared with students who had no such discussions. And unlike enrollment in any postsecondary education, parents' educational expectations did not appear to significantly increase the odds of moderate-to high-risk students enrolling in a 4-year college.[6] Interpreting the results from both outcomes, the findings suggest that parents play a very influential role in getting their moderate- to high-risk teens to enroll in postsecondary education, but have less influence on whether they enroll in a 4-year college or sub-baccalaureate institution.

[6]This result may be due in part to the fact that parents expectations for their children are generally high, especially for those who are academically prepared to enroll in college (Horn 1997). Therefore, once students' achievement level is controlled for, there is little variation in parents' expectations.

Consistent with the considerable research demonstrating peer group effects on educational outcomes (for a review see Hanushek, 1986), there was also evidence of this phenomenon in this study. In fact, the variable that most increased the odds of enrolling in a 4-year college was the number of friends with college plans. Compared to students who reported having no friends with college plans, the odds of enrolling were four times higher for those reporting that most or all of their high school friends planned to enroll in a 4-year college. Having friends with college plans also doubled the odds of students enrolling in any postsecondary education over not enrolling at all. The latter result may indicate that moderate- to high-risk students who are not yet prepared to enroll in a 4-year college, may be more likely than not to enroll some form of postsecondary education when most of their friends have college plans.

The importance that friends attributed to learning activities such as studying and getting good grades also increased the odds of enrolling in some form of postsecondary education, but did not significantly affect the odds of enrolling in a 4-year college. Thus, like the result for the parent involvement measures, associating with friends who are highly involved in learning activities is important for enrolling in some form of postsecondary education, but is less predictive of the level at which students enroll.

Unlike the strong effects of parent and peer engagement measures, net of the other engagement variables, the student engagement measures (level of secondary school attendance and extracurricular activities) had minimal effect on the enrollment outcomes. One explanation for the lack of effect for student attendance levels may have to do with the correlation between attendance behavior and achievement. Higher achieving students are more likely to report higher levels of attendance. Thus, once achievement is controlled for, there is little variation for attendance.

With respect to extracurricular activities, students who participated in two or more activities did have higher odds of enrolling in a 4-year college prior to introducing the peer engagement variables into the model (see table 7). Once the peer engagement variables were introduced, the effect of extracurricular activities involvement was no longer significant. Since participation in extracurricular activities is required or at the very least, encouraged by many 4-year colleges, the number of friends with college plans would be correlated with the likelihood of participating in extracurricular activities. Therefore, it is not particularly surprising to see that once this peer variable is introduced into the model, the effect of extracurricular activity involvement is minimized.

Unlike the effects on postsecondary enrollment, none of the engagement variables had a net effect on students' postsecondary persistence once enrolled. That is, for moderate- to high-risk

students who enrolled in postsecondary education, none of the student, parent, or peer engagement variables included in the full model increased their odds of enrolling immediately after high school graduation and attending full-time continuously from the time of enrollment. However, the indicator of persistence is based on a 2-year time period and is therefore limited in what it measures. It may also be the case that the factors contributing to persistence in higher education are those associated with students' college experiences rather than measures of high school engagement.

This study also demonstrated that, net of student, parent, and peer involvement measures, receiving assistance from teachers or other school staff in the college application process increased the odds of enrollment. For example, students who reported getting help in filling out their college application or preparing for entrance exams had higher odds of enrolling in a 4-year college than students who reported receiving no assistance. These activities tend to be more specific for enrolling in a 4-year college and therefore, only affected this outcome. On the other hand, when students reported obtaining financial aid information from two or more resources, or talked to one or more persons about financial aid, the odds of their enrolling in some postsecondary education also went up. With these data, however, it is not really possible to determine whether receiving assistance in the application process increased moderate- to high-risk students' chances of enrolling or whether those who made the decision to enroll sought out help in the process. Nevertheless, it is still worth noting the positive effect since this type of intervention on the part of the school is not particularly costly nor difficult to implement. School assistance is particularly important for at-risk students whose parents have no more than a high school education. When it comes to navigating their way through the application process, these students have less family guidance and experience to rely on relative to their peers with college-educated parents.

Finally, it should be noted that moderate- to high-risk students who participated in high school outreach programs had almost double the odds of enrolling in a 4-year college than their peers who did not participate. Even though relatively few at-risk students reported such participation (about 5 percent), the effect on college enrollment was significant. This finding confirms similar results reported for the High School and Beyond sophomore cohort of 1980 10th-graders (Adelman 1997). It is also consistent with the positive effect of receiving assistance in the college application process. In the end, this study showed that intervention, whether on the part of the parents or the school, played a positive role in helping moderate- to high-risk students make the transition from high school to college.

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APPENDIX A—GLOSSARY

This glossary describes the variables used in this report. The items were taken from the National Education Longitudinal Study (NELS:88/94). The variables used in this analysis were either items taken directly from the NELS surveys or they were derived by combining one or more items in these surveys. Variable names beginning with "BY" were collected in the base year (1988), "F1" variables were collected in the first follow-up (1990), F2 in the second follow-up (1992), and F3 in the third (1994).

The variables listed in the index below are in the order they appear in the report; the glossary is in alphabetical order by variable name (displayed along the right-hand column).

Glossary Index

RISK FACTORS
Number of risk factors BYRISK2
Lowest socioeconomic quartile ..... BYSES
Single parent family ..... BYFCOMP
Older siblings dropped out of high school F1S94
Changed schools two or more times from 1st to 8th grade BYP40
Average grades C's or lower from 6th to 8th grade BYGRD68
Held back one or more grades by 1988 ..... BYS74

STUDENT CHARACTERISTICS
Race–ethnicity F3RACE
Parents' highest education level F2PARED

STUDENT ENGAGEMENT WITH SCHOOL
Students' class attendance F1ATTEND
Students' extracurricular activities F1EXCUR

PARENT ENGAGEMENT WITH STUDENT'S LEARNING
Parents' educational expectations F1PAREXP
Parents discuss school-related matters with child F2PTALK

FRIENDS' ENGAGEMENT WITH LEARNING
Friends think learning is important F1FRSTUD
Number of friends who plan to attend a 4-year college F2FRCOLL

COLLEGE PREPARATION ACTIVITIES
Amount of aid information used by student AIDINFO1
Number of people student talked to about aid AIDTALK1
Participated in any high school outreach program ..... OUTREACH
Entrance exam preparation F2S45
Received help with postsecondary application process F2S57

POSTSECONDARY EDUCATION OUTCOMES
Enrolled in a 4-year college COLL4YR
Type of first institution ..... ANYPSE
Indicator of postsecondary persistence ..... PSEINDEX

STUDENT ACHIEVEMENT CONTROLS
Highest level math courses completed MTHQUAL8
8th-grade achievement ..... PREACH

Amount of aid information used by student **AIDINFO1**

This variable is a composite of several items asking students whether they had ever read any information from the U.S. Department of Education or postsecondary institutions to learn more about obtaining financial aid (Yes/No).

Number of people student talked to about aid **AIDTALK1**

A composite of several items asking students about individuals they talked to in order to learn more about financial aid. The composite represents the number of people students talked with about financial aid.

Type of first institution **ANYPSE**

This variable indicates the type of postsecondary institution first attended by the student. If student did not attend any postsecondary education, the value is zero.

Single parent family **BYFCOMP**

Describes the family or household composition. It was constructed from the student responses to items BYS8A-I, taken from the 1988 survey. For this analysis the responses were aggregated as follows:

Single parent family	Household is composed of mother only or father only.
Not from a single parent family	Household is composed of mother and father, mother and male guardian, father and female guardian or other combination of relatives/guardians.

Average grades C's or lower from 6th to 8th grade **BYGRD68**

Constructed from deciles of grade point averages categorized according to letter grades. For this analysis, the variable was aggregated as follows:

C's or lower grades	Student had average grades of C's or lower from 6th through 8th grade.
Higher than C grades	Student had higher than a C average from 6th through 8th grade.

Changed schools two or more times from 1st to 8th grade **BYP40**

In the 1988 survey, parents were asked how many times their 8th-grader had changed schools since he or she entered 1st grade. Changes that occurred as a result of promotion to one grade or level or a move from one elementary school to a middle school in the same district were not counted. This analysis aggregated the number of school changes as follows:

Two or more school changes	Student changed schools two or more times between 1st and 8th grades.

No more than one school change	Student changed schools between 1st and 8th grades no more than one time.

Number of risk factors **BYRISK2**

The sum of six possible risk factors that increase students' odds of dropping out of high school including:

1. Lowest SES quartile (BYSES)
2. Single parent family (BYFCOMP)
3. Older sibling dropped out of high school (F1S94)
4. Changed schools two or more times (reported by the parent) (BYP40)
5. Average grades of C's or lower from 6th to 8th grades (BYGRD68)
6. Repeated an earlier grade (BYS74)

All of the risk factors were identified as of the 8th grade with the exception of students having older siblings who dropped out of high school, which was asked in the 10th grade. If a student had missing data for two or more risk items, the variable was set to missing. Students with two or more risk factors were considered at moderate- to high-risk and were included in this analysis.

Held back one or more grades by 1988 **BYS74**

A direct question asked of the 1988 8th-grader: Were you ever held back (made to repeat) a grade in school?

Held back	Student was held back a grade in school.
Not held back	Student was never held back a grade in school.

Lowest socioeconomic quartile **BYSES**

A composite measure of socioeconomic status constructed using the following parent questionnaire data:

Father's education level
Mother's education level
Father's occupation
Mother's occupation
Family income

For cases where all parent data components were missing (8.1 percent of the participants), student data were used to compute the socioeconomic status percentile. The variable was aggregated to quartiles for this analysis.

Lowest quartile	Socioeconomic status fell at or below the lowest 25th percentile.
Middle quartiles	Socioeconomic status fell between the 25th percentile and the 75th percentile.
Highest quartile	Socioeconomic status fell at or above the 75th percentile.

Enrolled in a 4-year college **COLL4YR**

This variable is based on the type of first postsecondary institution (F3SEC2A1) attended by the student, and indicates whether or not a student first enrolled in a 4-year college. In about 5 percent of cases, F3SEC2A1 was missing, and for these students, their enrollment status as of October 1992 was used (ENST1092).

4-year college	Student's first postsecondary institution was a 4-year college.
Not a 4-year college	Student's first postsecondary institution was not a 4-year college.

Students' class attendance **F1ATTEND**

A measure of students' school attendance, asked in 1990. The variable is based on a factor analysis with a standardized factor score (mean=0 and standard deviation=1) on the following items asked of the student:

How many times they were late for school (F1S10A)
How many times they skipped school (F1S10B)
How many days they were absent (F1S13)

The index was aggregated quartiles as follows:

Low attendance	Student's attendance value fell below the 25th percentile.
Moderate attendance	Student's attendance value fell between the 25th and 75th percentiles.
High attendance	Student's attendance value fell above the 75th percentile.

Students' extracurricular activities **F1EXCUR**

Number of extracurricular activities in a variety of areas reported by the student in 1990. Includes sports, band, theater, student government, academic societies, yearbook, service clubs, and hobby clubs. The variable was aggregated as follows:

None	Student did not participate in any extracurricular activities.
One	Student participated in one extracurricular activity.
Two or more	Student participated in two or more extracurricular activities.

Friends think learning is important **F1FRSTUD**

A composite measure of students' peer engagement with respect to the importance of learning activities. Based on a factor analysis with a standardized factor score (mean=0 and standard deviation=1) of the following variables where students indicated how important (not important, somewhat important, very important) friends thought it was to:

Attend classes	(F1S70A)
Study	(F1S70B)
Get good grades	(F1S70D)
Finish high school	(F1S70F)
Continue education past high school	(F1S70I)

Not very important	Students' friends' index of importance for learning fell below the 25th percentile.
Moderately important	Students' friends' index of importance for learning fell between the 25th and 75th percentile.
Highly important	Students' friends' index of importance for learning fell above the 75th percentile.

Parents' educational expectations **F1PAREXP**

Variable was based on the highest educational expectations reported by either the student's father or mother in 1990. For this analysis, the variable was aggregated as follows:

High school diploma or less	Parents expected student to attain a high school diploma or less.
Some college	Parents expected student to attend some postsecondary education, but short of a bachelor's degree.
Bachelor's degree or higher	Parents expected student to attain a bachelor's or higher.

Older siblings dropped out of high school **F1S94**

In the 1990 survey, students were asked how many brothers or sisters (including adopted, step-, or half-siblings) left high school before graduating. For this analysis, the variable was aggregated to:

One or more siblings dropped out	One or more siblings had dropped out of high school.
No siblings dropped out	None of student's siblings were in high school, student was an only child or the oldest, none of student's siblings had dropped out of high school.

Number of friends who plan to attend a 4-year college **F2FRCOLL**

Based on an item: "How many of your friends plan to attend a 4-year college?" asked on the 1992 survey.

None	None of student's friends planned to attend 4-year college.
Few to some	Few to some friends planned to attend 4-year college.
Most to all	Most or all of student's friends planned to attend 4-year college.

Parents' highest education level **F2PARED**

This composite variable characterizes the level of education attained by the student's parent with the highest reported education level. It was constructed using the second follow-up parent questionnaire data. New student supplement data were used if parent data were missing. For this analysis, the variable was aggregated as follows:

High school or less	Neither parent completed high school, or at least one parent completed high school or GED.
Some postsecondary education	At least one parent attended some postsecondary education or college, but neither attained a bachelor's degree.
Bachelor's degree or higher	At least one parent was a college graduate, or had attained an advanced degree.

Entrance exam preparation **F2S45**

A composite measure based on a positive student response to the following concerning their preparation activities for taking entrance exams (asked in 1992) (Yes/No):

Took a special course at student's high school	(F2S45A)
Took a course offered by a commercial test preparation service	(F2S45B)
Received private one-on-one tutoring	(F2S45C)
Studied from test preparation books	(F2S45D)
Used a test preparation video tape	(F2S45E)
Used a test preparation computer program	(F2S45F)

Received help with postsecondary application process **F2S57**

A composite measure based on a positive student response to several items asked in 1992 concerning whether or not students received help from their high school in the following areas (Yes/No):

Help with filling out vocational/technical school or college applications?	(F2S57A)
Help with filling out financial aid forms?	(F2S57B)
Assistance in writing essays for vocational/technical school or college applications?	(F2S57C)
Days off from school to visit vocational/technical schools or colleges?	(F2S57D)

Parents discuss school-related matters with child **F2PTALK**

A composite measure of parent engagement determining how frequently parents discussed school matters with their child. It is based on a factor analysis with a standardized factor score (mean=0 and standard deviation=1) of the following variables: How frequently during the past two years have you and/or your spouse/partner talked about the following with your teenager?

Selecting courses or programs at school	(F2P49A)
School activities or events of particular interest to your teenager	(F2P49B)
Things your teenager has studied in class	(F2P49C)
Your teen's grades	(F2P49D)

Plans and preparation for the American College Testing test (ACT), Scholastic Aptitude Test (SAT), or Armed Services Vocational Aptitude Battery (ASVAB)	(F2P49E)
Applying to colleges or other schools after high school	(F2P49F)

The index was coded into quartiles as follows:

Little to no discussion	Parents' index for level of discussion fell below the 25th percentile.
Some discussion	Parents' index for level of discussion fell between the 25th and 75th percentile.
Much discussion	Parents' index for level of discussion fell above the 75th percentile.

Race–ethnicity **F3RACE**

Based on the 1992 identification unless it was missing or incorrect. In addition, if it became apparent from responses to other questions that the preloaded 1992 value was incorrect, the value was corrected in 1994. Sample members with the value of "Other" were assigned as missing.

Asian/Pacific Islander	A person having origins in any of the Pacific Islander peoples of the Far East, Southeast Asia, the Indian subcontinent, or Pacific Islands. This includes people from China, Japan, Korea, the Philippine Islands, Samoa, India, and Vietnam.
Hispanic	A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
Black, non-Hispanic	A person having origins in any of the black racial groups of Africa, not of Hispanic origin.
White, non-Hispanic	A person having origins in any of the original peoples of Europe, North Africa, or the Middle East (except those of Hispanic origin).
American Indian/Alaskan Native	A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

Highest level math courses completed **MTHQUAL8**

This variable describes the highest sequence of math courses student completed in high school. It is based on high school transcripts.

No math	Student did not take any math courses.
Non-academic	Student took non-academic courses which include those classified as "general mathematics" or "basic skills mathematics."

Low academic	Student took low academic courses which comprise the preliminary (e.g., pre-algebra) or reduced rigor/pace mathematics courses (algebra I that is spread over two academic years, and "informal geometry"), but that are classified as more rigorous than the non-academic courses.
Completed algebra I and geometry	Completed two years of mathematics including algebra I and geometry, or two years of unified mathematics.
Completed algebra II	An additional year of mathematics was completed including algebra II or a third year of a unified mathematics program.
Completed "advanced courses"	An additional year of mathematics was completed in any course labeled as "advanced," including various trigonometry, probability, and statistics courses.
Completed introductory analysis	An additional year of mathematics was completed including introductory analysis or precalculus.
Completed calculus	An additional year of mathematics was completed including any calculus course.

Participated in any high school outreach program **OUTREACH**

Based on the series of questions asking students about their year-to-year participation in any special outreach programs, such as Upward Bound or Talent Search. If they answered yes to participating in any year for any special program they were coded yes.

8th-grade achievement **PREACH**

Composite test score based on the mean of 1988 math, science, reading, and social studies test scores.

Indicator of postsecondary persistence **PSEINDX**

For students who enrolled in postsecondary education, this variable indicates whether or not they enrolled full time within one year after high school graduation and attended continuously from first enrollment (other than summer months).

Strong persistence indicators	Student enrolled full time within one year of high school graduation and attended continuously.
Other	Student delayed enrollment, started part time, or had non-continuous enrollment.

APPENDIX B—TECHNICAL NOTES AND METHODOLOGY

THE NATIONAL EDUCATION LONGITUDINAL STUDY OF 1988

The National Education Longitudinal Study of 1988 (NELS:88) is a survey that began with a nationally representative sample of 1988 8th-graders and surveyed them every two years. The most recent follow-up survey occurred in 1994. Respondents' teachers and schools were also surveyed in 1988, 1990, and 1992, while parents were surveyed in 1988 and 1992. In contrast to previous longitudinal studies, NELS:88 began with 8th-graders in order to collect data regarding the transition from elementary to secondary education. The first follow-up in 1990 provided the data necessary to understand the transition. Dropouts were administered a special survey to understand the dropout process more thoroughly. For the purpose of providing a comparison group to 1980 sophomores surveyed in one High School and Beyond Institutional Study (HS&B), the NELS:88 sample was also "freshened" with new participants who were 10th-graders in 1990.

In spring of 1992, when most of the NELS:88 samples were 12th-graders, the second follow-up took place. This survey focused on the transition from high school to both the labor force and postsecondary education. The sample was also "freshened" in order to create a representative sample of 1992 seniors for the purpose of conducting trend analyses with the 1972 and 1982 senior classes (NLS-72 and HS&B). Students identified as dropouts in the first follow-up were also resurveyed in 1992. In spring of 1994, the third follow-up was administered. It was this follow-up that provided information about postsecondary enrollment experiences used in this report. Sample members were also questioned about their labor force participation and family formation. For more information about the NELS:88 survey, consult the NELS:88/94 Methodology Report.[7]

[7]U.S. Department of Education, National Center for Education Statistics, *National Education Longitudinal Study (NELS:88/94) Methodology Report*, NCES 96–174 (Washington D.C.: 1996).

SAMPLE USED IN THE ANALYSIS

Because this analysis was concerned with "resilient" students at risk—high school graduates who, in the 8th grade, were at risk of dropping out but who did not drop out—the NELS 1992 high school graduate cohort was used as the base sample (i.e., F3QWT92G weight variable was used). In addition, only students considered at moderate to high risk of dropping out of high school were included in the analysis (see description of risk variables under the BYRISK2 entry in appendix A). Moderate to high risk was defined as having two or more of six possible risk factors. Among this sample, students also had to have values for the three outcomes analyzed (for description of outcome variables, see "Statistical Procedures" below).

STATISTICAL PROCEDURES

There were three outcome variables analyzed in the study. Two describe at-risk students' postsecondary education enrollment status within two years after high school graduation: (1) attended a 4-year college versus all others (including a non-4-year college or no college at all); and (2) attended any postsecondary education versus those who never attended. The third outcome was a measure of postsecondary persistence and classified students with (and without) indicators of strong postsecondary persistence among those who enrolled. Because all three outcomes are dichotomous variables (0=No and 1=Yes), a logistic regression model was used to perform multivariate analyses. In order to take into account the complex nature of the NELS survey design, SUDAAN software application was used. SUDAAN uses a Taylor series approximation technique to estimate standard errors for the logistic regression estimates, a method that takes into account the stratified sample design of the survey. For a detailed description of SUDAAN, please refer to SUDAAN Users Manual.[8] The syntax of the SUDAAN program is illustrated by the following example, which produced the output for step 4 in Table 7:

[8]B. Shah, B. Barnwell, P. Hunt, and L. LaVange, SUDAAN Users Manual (North Carolina: Research Triangle Institute: 1995).

```
PROC LOGISTIC DATA="c:\\logcoll" FILETYPE=sas DESIGN=WR;
NEST strata psu;
WEIGHT f3qwt92g;
SUBGROUP f2ptalk f1parexp f1attend f1excur f1frstud f2frcoll aidinfo1
         aidtalk1 outreach f2helpex f2helpap SINGLE HELDBACK sibdrop
         mthqual8;
LEVELS 4 6 4 4 4 4 4 6 2 3 3 2 2 2 9;
MODEL coll4yr = f2ptalk f1parexp f1attend f1excur f1frstud f2frcoll
                aidinfo1 aidtalk1 outreach f2helpex f2helpap single
                heldback sibdrop byses byp40 bygrd68 preach mthqual8;
SETENV COLWIDTH=11 DECWIDTH=2 COLSPCE=2 LINESIZE=78;
PRINT BETA SEBETA T_BETA P_BETA;
PRINT / RISK=all;
PRINT / TESTS=default;
TITLE "Attended a 4-year college or not".
```

In this program, the first command is procedure statement that indicates a logistic regression procedure. "LOGCOLL" is the SAS system file that stores the data for the study. Design statement is "with replacement." "STRATA" and "PSU" are stratum and psu variables derived from the student ID in NELS:88. The subcommands of "SUBGROUP" and "LEVELS" indicate the levels of all categorical variables included in the model. For variables with 10 percent or more missing cases, a "missing" category was included in the analysis. The subcommand of "MODEL" specifies the logistic regression model with the dichotomous outcome variable of "COLL4YR" (enrolled in a 4-year college) and all independent variables that we were interested in examining.

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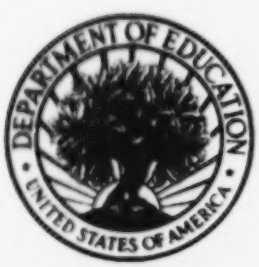

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